

Discussion

The TU1 excavation suggests – at minimum – that SF1 was a hearth associated with short-time occupation of the main chamber. The absence of food remains (such as bird bone) in SF1 and elsewhere in the chamber might suggest the hearth was ignited for heat or light, as opposed to food preparation. The shallow deposit also indicates limited or one-time use of the hearth.

6.3 ANTI-ARMOR LIVE FIRE AND TRAINING RANGE EXTENSION (AALFTR EXT) SITE DESCRIPTIONS

Seven archaeological sites are present in the AALFTR Extension (Table 15; see Figure 11) Six of the sites were previously identified by Shapiro *et al.* (1998) (Site 18671), and Williams (2002) and Roberts *et al.* (2004b) (Sites 21667, 21669, 21670, and 21671). Sites 23466 and 23470 were newly identified during the current study.

Table 15. Summary of AALFTR Extension Sites

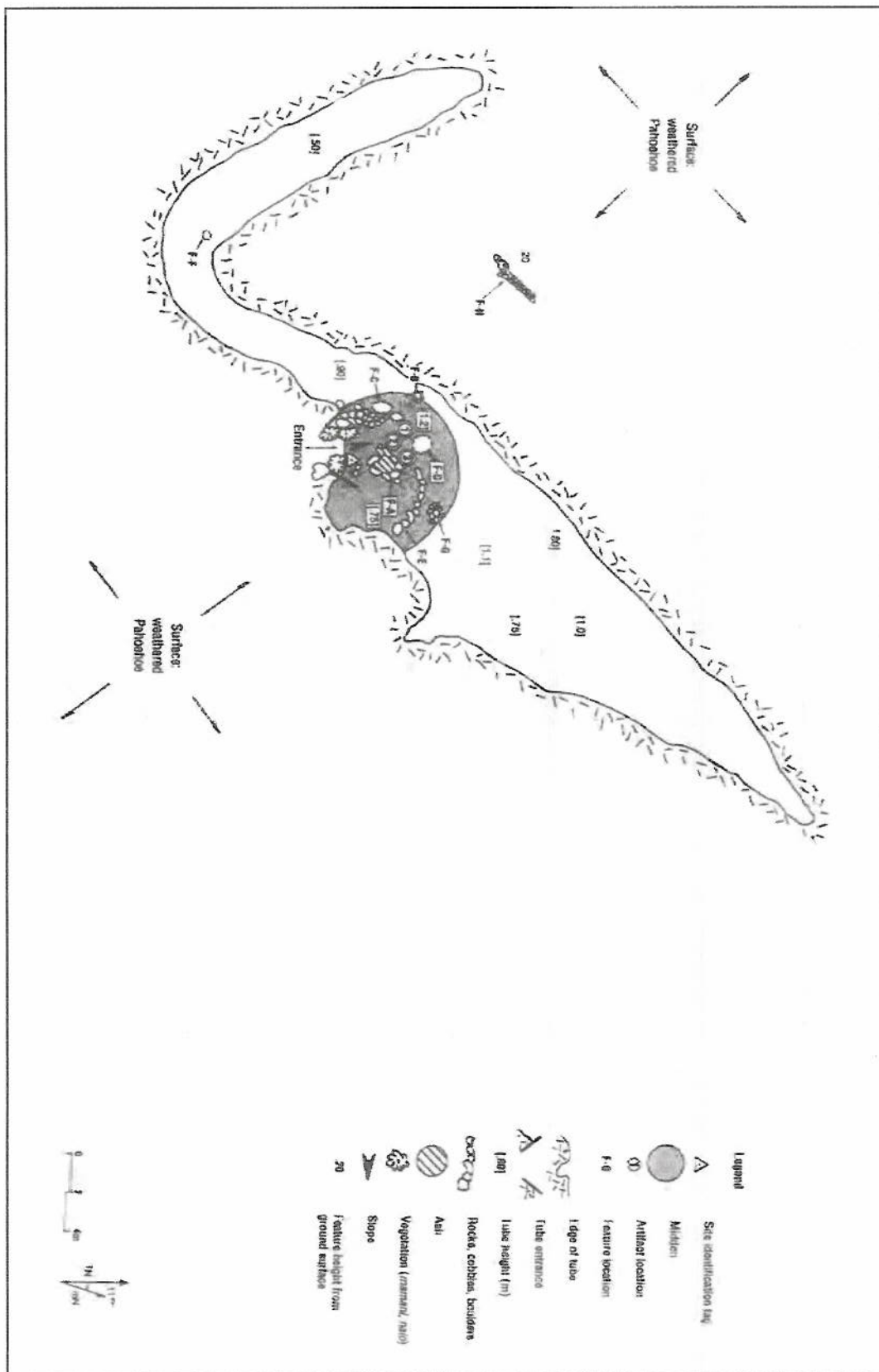
SHPO Site (50-10-31-)	Site Type	Function	Phase II Work	
			Tested	Mapped
18671	Lava tube	Repeated-use occupation		–
21667	Modified lava flow	Volcanic glass quarries		X
21669	Modified lava flow	Volcanic glass quarries		X
21670	Modified lava flow	Volcanic glass quarries		X
21671	Modified lava flow	Volcanic glass quarries		X
23466	Terrace	Trail		X
23470	Mound	Possible marker		X

Site 50-10-31-18671		GANDA Site:	903
Site Type:	Lava tube	Training Area:	Impact
Function:	Limited-use Occupation		
Possible age:	AD 1470- 1955		
No. of Features:	Eight (includes military structure)		
Site Size:	Approximately 60 m by 8 m (maximum) (0.004 hectare)		
Cultural Material:	None observed		
Condition:	Fair; cave floor impacted by ungulates		
Significance:	D: <i>Information potential</i> ; site yields important scientific data regarding Hawaiian occupation and resource exploitation in the Saddle Region.		
Historic Context:	Traditional Hawaiian occupation (<i>ca.</i> AD 780-Contact)		

Recommendation: Avoidance and protection during all SBCT-related projects.

Description: Site 18671 is a small lava tube located on the edge of a weathered pāhoehoe kipuka roughly 95 m east of Redleg Trail (Figure 89). The site was previously documented by BioSystems (Shapiro *et al.* 1998:30-36) as a Hawaiian shelter with seven internal features (Features A-G) and a probable military structure on the ground surface (Shapiro *et al.* 1998: 28). Most of the internal features, including midden and artifact concentrations, “cupboards,” a wall, and rock-lined hearth, were clustered within the lightzone adjacent to the tube entrance. Several samples of cultural material were collected from the site including: a basalt manuport, three ‘opihi shells, a volcanic glass blade, various lithics, ash, wood, and botanicals. Two charcoal

Figure 89. Plan View of Site 18671 (From Shapiro et al. 1998)



samples from the lava tube interior produced calibrated (2σ) ages ranging between AD 1478 to 1680 from the back of the tube and AD 1630 to 1955 (Feature C) near the entrance (Shapiro *et al.* 1998:28).

An excerpt of the site description provided in Shapiro *et al.* (1998:28) follows:

The entrance into the tube is very narrow (e.g., 2.8 m wide and 0.8 m high) and was obscured by vegetation. The interior shelter is characterized by a low ceiling averaging only 1.0 m high. The tube extends approximately 30 m in both north and south directions from the entrance. The primary cultural component occurs at the entrance into the tube, and within an area of 7 m north-south by 12 m east-west and 0.75 m high....The features are described as follows:

Feature A is a rock-lined hearth probably containing contemporary use as evidenced by a 1960s-era Pepsi can located nearby;

Feature B is a possible rock cupboard containing bird bone;

Feature C is a concentration of basalt flakes, bird bone, and charcoal;

Feature D is a basalt flake and fire spall concentration;

Feature E is a rock wall alignment;

Feature F is a charcoal concentration (located approximately 12.0 m from the entrance and within the west chamber of the tube);

Feature G is a possible rock cupboard; and

Feature H is a rock windbreak of probable military origin.

Site 50-10-31-21667		GANDA Site:	Multiple
Site Type:	Modified lava flow	Training Area:	21
Function:	Volcanic glass quarries		
Possible age:	Pre-Contact		
No. of Features:	3 in AALFTR Ext.		
Site Size:	Roughly 8,000 m ² (0.07 hectare)		
Cultural Material:	Quarry debitage		
Condition:	Fair		
Historic Context:	Resource Procurement (postdates age of lava flow – 330 years B.P.)		
Significance:	D: <i>Information potential</i> ; site yielded important scientific data regarding quarry methods specific to the k4 flow in the Saddle Region.		
Recommendation:	Avoidance and protection during all SBCT-related projects.		

Description: Site 21667 is composed of three volcanic glass quarries inside the AALFTR Extension and an additional 35 quarries to the east (Roberts *et al.* 2004b). The site is located in a *pāhoehoe* flow (k4 flow) formed 330 years before present. The boundaries of all three quarries were previously mapped by Roberts *et al.* (2004b) using a gps (Figure 90). The quarry features were grouped under a single site based on proximity.

The quarries range between 10.0 m by 20.0 m and 70.0 m in diameter.

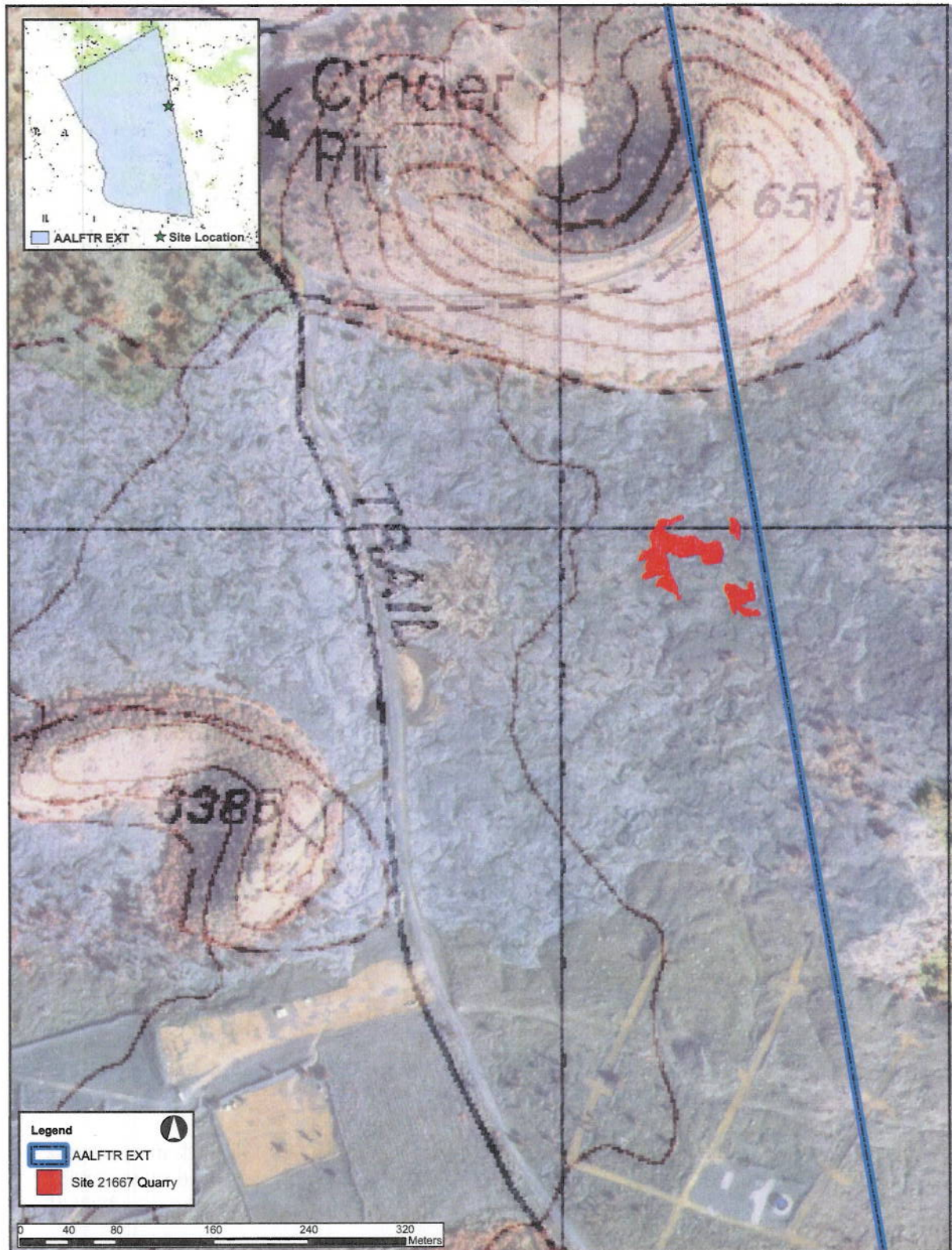


Figure 90. Site 21667; Distribution of Quarries on Orthophoto and USGS Quadrangle

Site 50-10-31-21669		GANDA Site:	282-287, 292
Site Type:	Modified lava flow	Training Area:	21
Function:	Volcanic glass quarries		
Possible age:	Pre-Contact		
No. of Features:	2 in AALFTR Ext.		
Site Size:	Roughly 1,300 m ² (0.01 hectare)		
Cultural Material:	Quarry debitage		
Condition:	Fair		
Historic Context:	Resource Procurement (less than 330 years B.P.)		
Significance:	D: <i>Information potential</i> ; site yielded important scientific data regarding quarry methods specific to the k4 flow in the Saddle Region.		
Recommendation:	Avoidance and protection during all SBCT-related projects.		

Description: Site 21669 is composed of two volcanic glass quarries inside the AALFTR Extension and an additional four quarries to the east (Roberts *et al.* 2004b). The site is located in a *pāhoehoe* flow (k4 flow) formed 330 years before present. The boundaries of both quarries were previously mapped using a gps by Roberts *et al.* (2004b) (Figure 91). The quarry features were grouped under a single site based on proximity.

The quarries inside the AALFTR Ext. are 11.0 m by 12.0 m and 7.0 m by 12.0.

Site 50-10-31-21670		GANDA Site:	3
Site Type:	Modified lava flow	Training Area:	Impact; 21
Function:	Volcanic glass quarries		
Possible age:	Pre-Contact		
No. of Features:	20		
Site Size:	Roughly 240,640 m ² (2.2 hectares)		
Cultural Material:	Quarry debitage		
Condition:	Fair; impacts from live-fire training		
Historic Context:	Resource procurement in Saddle (less than 330 years B.P.)		
Significance:	D: <i>Information potential</i> ; site yielded important scientific data regarding quarry methods specific to the k4 flow in the Saddle Region.		
Recommendation:	Avoidance and protection during all SBCT-related projects.		

Description: Site 21670 is composed of 20 volcanic glass quarries located in a *pāhoehoe* flow (k4 flow) formed around 330 years before present. The site area is within the impact area and ordnance and fragmented metal was observed throughout the site. During the Phase II survey, the boundaries of all 20 quarries were documented and mapped using a gps (Figure 92).

The sizes of the individual quarries vary depending on the extent of the glassy crusts. Many of the quarries occur along ropey surfaces and vertical faces formed by uplifted lava (Figures 93-96).

Table 16 provides a summary of the site features.

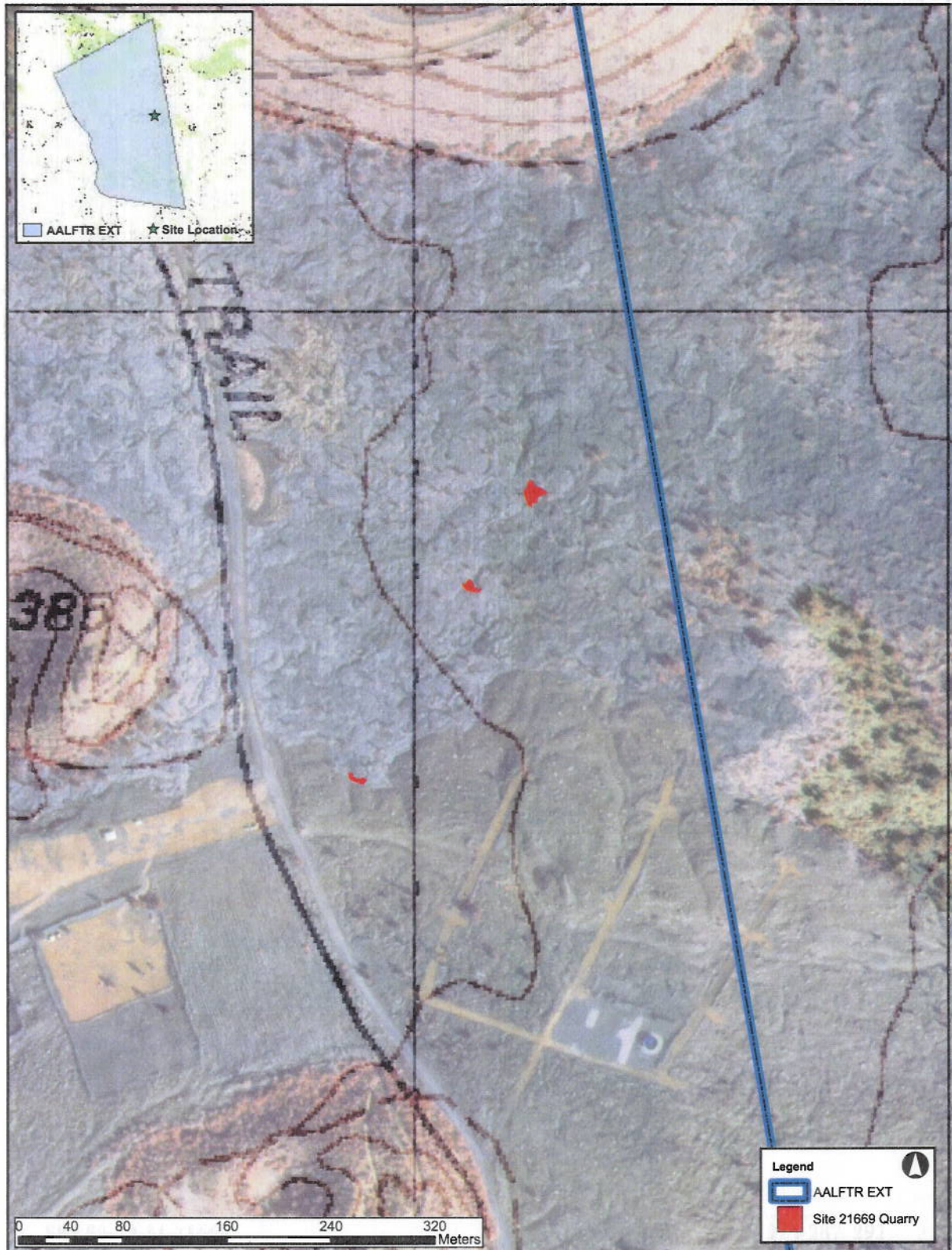


Figure 91. Site 21669; Distribution of Quarries on Orthophoto and USGS Quadrangle

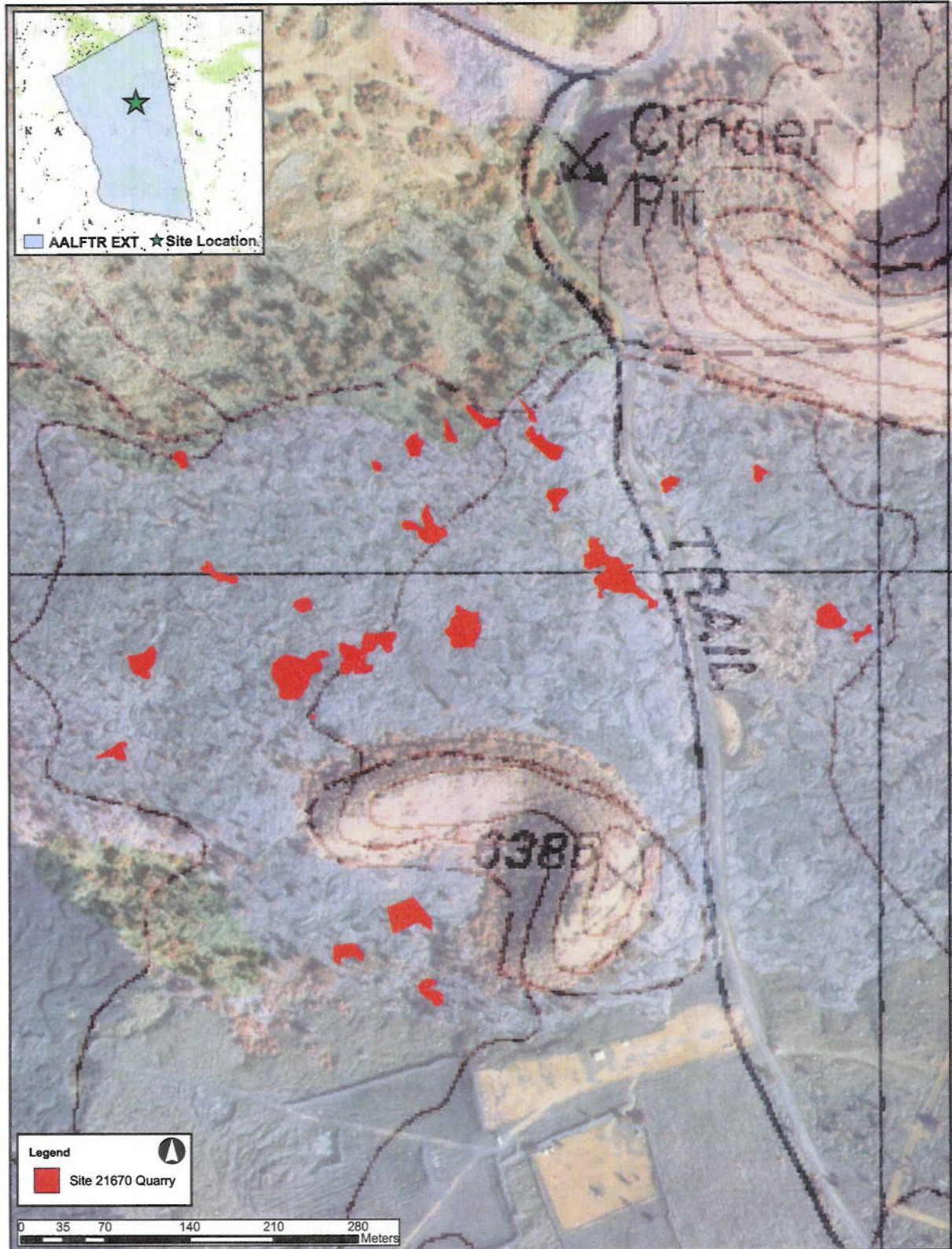


Figure 92. Site 21670; Distribution of Quarries on Orthophoto and USGS Quadrangle

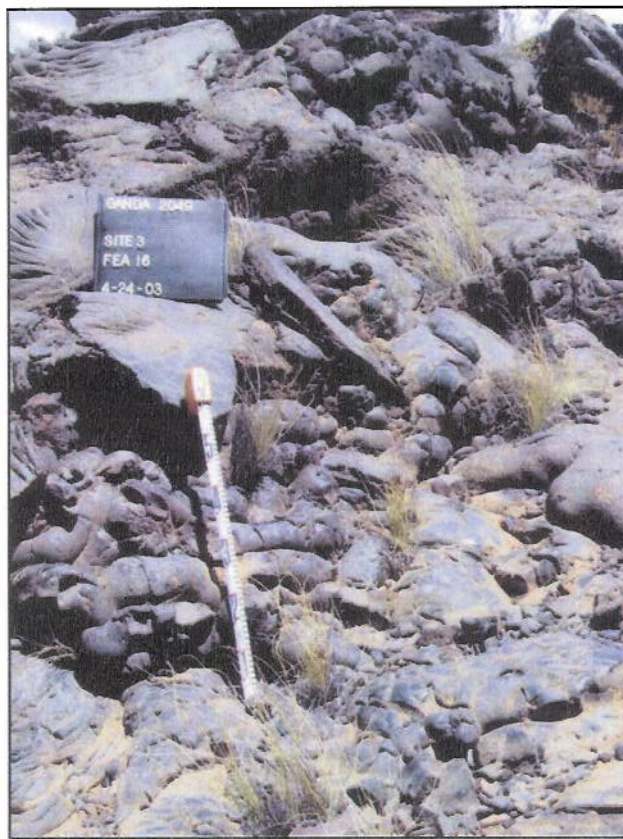


Figure 93. Site 21670, Feature 16 Quarry

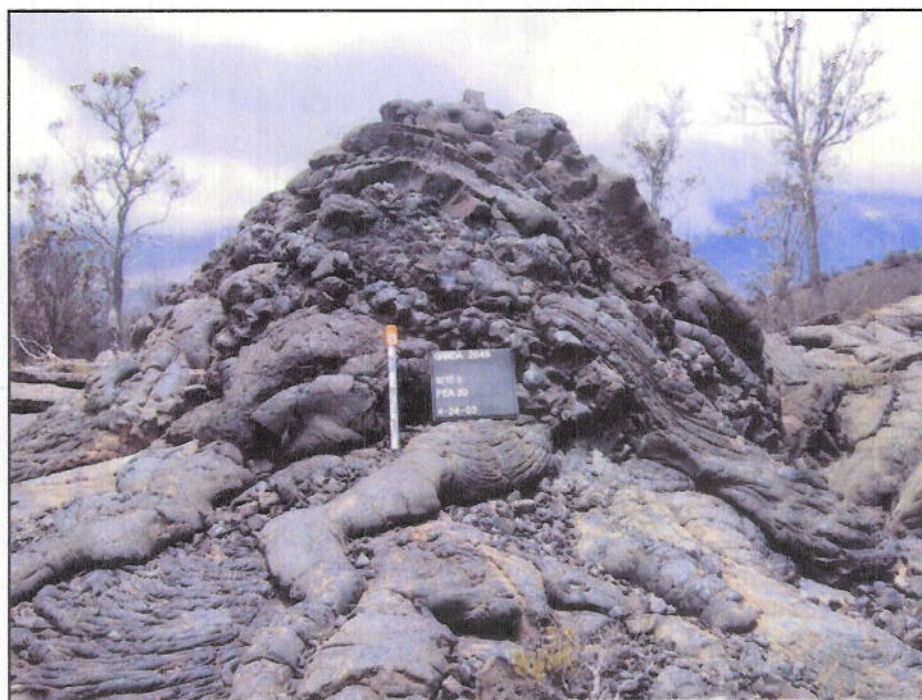


Figure 94. Site 21670, Feature 20 Quarry



Figure 95. Site 21670, Feature 17 Quarry



Figure 96. Site 21670, Feature 24 Quarry

Table 16. Summary of Site 21670 Volcanic Glass Quarries

Feature No	Size
1	13 m ²
2	12 m ²
3	16 m x15 m
4	35 m x11 m
5	23 m x7 m
6	24 m x13 m
7	13 m ²
8	25 m x14 m
9	40 m by 50 m
10	55 m by 32 m
11	11 m by 15 m
12	36 m by 33 m
13	30 m by 40 m
14	80 m by 35 m
15	16 m ²
16	24 m by 15 m
17	22 m by 40 m
18	12 m by 24 m
19	18 m by 8 m
20	26 m by 23 m

Site 50-10-31-21671

Site Type:	Modified lava flow	GANDA Site:	
Function:	Volcanic glass quarries	Training Area:	Impact; 21
Possible age:	Pre-Contact		
No. of Features:	10 inside AALFTR Ext.		
Site Size:	Roughly 39,000 m ² (0.3 hectare)		
Cultural Material:	Quarry debitage		
Condition:	Fair; impacts from live-fire training		
Historic Context:	Resource Procurement (less than 330 years B.P.)		
Significance:	D: <i>Information potential</i> ; site yielded important scientific data regarding quarry methods specific to the k4 flow in the Saddle Region		
Recommendation:	Avoidance and protection during all SBCT-related projects.		

Description: Site 21671 is composed of 10 volcanic glass quarries inside the AALFTR Extension and an additional three quarries to the east (Roberts *et al.* 2004b). The site is located in a *pāhoehoe* flow (k4 flow) formed around 330 years before present. The site was previously mapped by Roberts *et al.* (2004b) using a gps (Figure 97).

The size of the quarries inside the AALFTR Extension range between 5.0 m² and 32.0 m by 25.0 m.

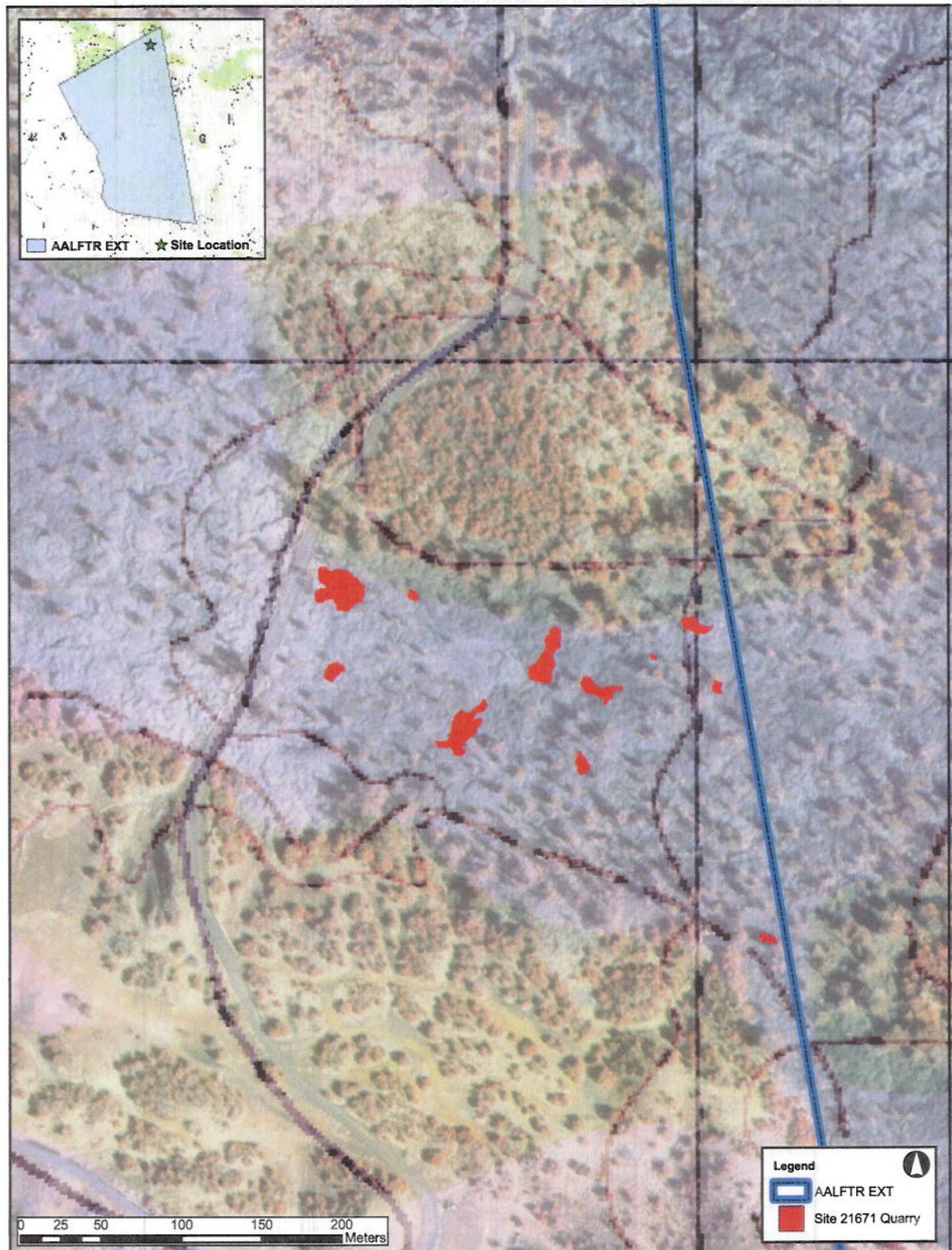


Figure 97. Site 21671; Distribution of Quarries on Orthophoto and USGS Quadrangle

Site 50-10-31-23466		GANDA Site No:	4
Site Type:	Retaining wall	Training Area:	Impact
Function:	Possible trail		
Possible age:	Post-Contact		
No. of Features:	1		
Site Size:	40 m long by 1.5 m wide (0.0005 hectare)		
Cultural Material:	None observed		
Condition:	Fair; architecture partly collapsed		
Historical Context:	Travel and resource procurement in Saddle (Pre-Contact /post-Contact)		
Significance:	D: <i>Information potential</i> ; site yields important location and construction data regarding pre-Contact travel routes in the Saddle.		
Recommendation:	Avoidance and protection during all SBCT-related projects.		

Description: Site 23466 is a retaining wall aligned roughly east-west and parallel to the north slope of Puu Kulua (Figure 98). The site is roughly 125 m west of Redleg Trail. The *pu'u* was impacted by previous military training activities, as suggested by the construction of jeep roads and military structures (walls and C-shapes). The site may have functioned as a pre-Contact foot trail that was historically modified with curbing for horse travel. Despite the presence of military structures in the area, the site appears to be traditional Hawaiian in origin because of its well-faced and stable construction.

The trail is preserved in two sections on the east and west. The western-most section is shown on Figures 99 through 101. The trail is characterized by a 1-2 course small boulder wall retaining a roughly level and trodden soil surface on the south side. Scattered pebbles and cobbles on the surface of the trail may be a remnant pavement. The site averages 1.8 m wide by 0.5 m high. The eastern-most section begins at the base of the *pu'u* and ascends roughly 10 m until paralleling the slope in an east-west direction. The western section is roughly 20 m west of the first section and extends 7.5 m long. The south side is bounded by the ascending slope of the *pu'u*.

Site 50-10-31-23470		GANDA Site:	6
Site Type:	Mound	Training Area:	Impact
Function:	Possible marker		
Possible age:	Undetermined		
No. of Features:	1		
Site Size:	1.6 m ² (0.00001 hectare)		
Cultural Material:	None observed		
Historical Context:	Possible travel in Saddle (Pre-Contact /post-Contact)		
Significance:	D: <i>Information potential</i> ; site may yields important location data of former transportation route in Saddle.		
Recommendation:	Avoidance and protection during all SBCT-related projects.		

Description: Site 23470 is a mound on a level soil area on the west side of Pu'u Kulua and roughly 530 m west of Redleg Trail (Figures 102 and 103). Numerous recent military structures, such as circular enclosures and alignments, and eroded jeep roads are on the west side of the *pu'u*. The site is